

UPDATE: MEAT RESEARCH PRIORITIES

by

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Efforts in Research Planning

Since the mid 1950's, research administrators in the USDA and the State Agricultural Experiment Stations have been involved in a continuing national research planning effort. This effort has varied among the four regions (South, North East, West, and North Central), but has involved experiment station scientists, administrators, and federal research personnel. Many committee meetings and reports have taken place with considerable expenditure in terms of travel funds and hours of scientist time. For the above reason, one can seriously question the cost benefit ratio of this effort. However, the success rate has been enough to indicate that research programs noted high in priority have received increases in funding. For example, beef cattle research received a high priority in these planning efforts and during the present fiscal year the State Agricultural Experiment Stations received additional USDA (Hatch) funds for beef cattle research and funds to support research on soybeans and feed grains.

Meat Research a Second Priority

Where is meat research in terms of priority when compared with other areas? Traditionally, meat research has been included in commodity programs such as swine, sheep and beef cattle research. Although one can reason that meat research should logically be a part of these commodity research oriented programs, a problem in combining them results. Research planning committees have quite naturally been dominated by heads, or chairmen, of departments who are, primarily, product oriented. Thus, it is conceivable that meat research may have been relegated to a second order of priority. This is surely the case on an individual basis if you as scientists have failed to sell your research program on the basis of its importance and needs.

Food Science departments have also had to fight for recognition for their place among other more traditional departments. For example, out of more than 20 advisory committees made up of heads or chairmen of departments in the North Central Region, it was not until 1973 that a Food Science Advisory Committee was established by the North Central Regional Directors.

All of this leads once again to the remarks made recently at this year's Meat Industry Research Conference in Chicago. At that time I tried to point out the shabby treatment agricultural research was receiving and, especially, the inadequacy of support, both private and public, for food and meat research. The financing picture is still not bright. Therefore, it is worthwhile to reiterate the need for you to evaluate your program in terms of current needs and future trends in the industry. Take time to think—think about your research program—are you following or are you leading? Are you breaking new ground or are you treading water?

Document on Research Needed

If you have a good program, talk about it; not only to your colleagues in meat research, but, more importantly, to your administrators.

I am convinced that in order to do what I have suggested a great need for this group of scientists to have some good skull sessions on the topic of Meat Research needs of the Future will develop. No one person can do this alone—but certainly the brain power is present in the AMSA to accept this challenge. Obviously, such sessions should culminate in a document that outlines the short and the long term research needs of the meat industry (red meat, poultry and fish) and gives ample justification for these priority problems.

Once the document is available it can serve many useful purposes.

You can use it internally within your own research institution to help sell your program to administrators holding the purse strings. But, perhaps even more important, it will allow your administrators to become more knowledgeable about meat research needs. Externally, a documentation of meat research priorities can be used with administrators of extra-

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mural sources of funds—such as the industry, USDA, NSF, NIH, and other funding organizations.

What Are The Meat Research Priorities?

To support my plea for establishing a listing of meat research priorities, allow me to ask you to list the top five priority needs and *justify* these in either short or long term benefits to the industry. If time were available for a response, many of you would be hard pressed, and, certainly, you as individuals, would have widely varying priorities.

Various associations and individuals have been giving some attention to priorities in meat research with information from some of you. Their efforts may well serve to help you in your thinking. I cite the following examples.

North Central Research Needs Categories

A North Central Regional Publication No. 241 outlines the Research Needs in Meats 1977 to 2000 A.D. This publication was prepared by the NCA-6 Committee made up of chairmen or heads of Animal Science Departments. It was outlined by Dr. Harold Tuma, one of our group, when he served as Chairman of Animal Science at South Dakota State University and by Dr. Don Good, Head of Animal Science at Kansas State. The publication projects future trends in the industry and, although a priority was not established, the following general categories were listed:

1. Determining and developing ways to control mechanisms that regulate protein growth in meat animals.
2. Product use.
3. Quality control.
4. Improved marketing systems.

Obviously, these titles are quite broad and not specific enough for most decision makers.

Some of the Scientific Services Research Needs

From the Assistant Director of Scientific Services of Meat and Poultry Inspection Program, I received a long list of research needs—some quite specific (37 in total). I will share this list with any of you upon request, however, for today's purpose, I'll select only a few topics of interest to this group and which also indicate the variety of needs by this agency.

1. Methods for remotely determining meaningful ante-mortem temperature of food animals.

2. Detection of fish in meat products.
3. Improving the current analytical methodology for meat and poultry products to detect lower levels of sulfa.
4. Conduct basic metabolism studies in animals using prototype drugs; develop model systems so metabolism of a drug may be predicted between species and/or sick and well animals.
5. Assay for nutritional composition.

U. S. Commissioner of Food & Drugs List

The Commissioner of the U.S. Commission of Food and Drugs has listed Food Safety problems and ranks in very high priority as one might expect:

1. Food borne infections—especially in foods because of an increase in synthesizing food.
2. Malnutrition—we need to know more about artificially constituted foods—what amounts, nutritional equivalency, trace minerals, etc.
3. Food additives.

Cooperative Research/Science & Education Administration List

Dr. Aldrich, Deputy Director, Cooperative Research/Science and Education Administration, in the USDA, requested Dr. Zobrisky to identify areas of meat research of importance nationally. He and a number of the ARS National Program Staff identified eight areas among which were:

1. Wholesomeness assurance, covering residues, microbiology, toxicology, general safety, techniques of handling and selling, etc.—visual quality attributes.
2. Animal Growth and Development—specifically protein synthesis and lipid mobilization—maximization of the former and controlling the latter in the live animals.
3. Nutritional value to humans—nature, quantity, quality and role of trace elements and other trace components.
4. Functionality of specific meat proteins—optimum utility from nutritional and economic vantages.
5. Analogues—meat containing foods—emulsions—extrusion techniques—plant—animal protein foods—need exist to uncover underlying principles involved—industry will develop the new products as opportunities arise.
6. Fat and cholesterol—health problems.

Federal Grants for Basic Research

In 1977 the Animal Science Societies had considerable concern over the fact that the competitive grant program for agriculture was targeted upon basic research important to plant production and human nutrition with absolutely no financing for animal research. However, these proposed funds should have substantial benefits in improving the feed-base utilized by the livestock industry.

Basic Research – Needs Summarized

After some joint discussions among representatives of the Dairy, Meat Animal and Poultry Science Associations, a document was developed and transmitted to the U.S.D.A. for consideration. It specifically identified basic research needs for animal production and animal products. The product research related primarily to quality and safety and was summarized as follows:

A. *Nutrient and Growth Additives*

Basic research on the potential human health hazards and/or residues in products that may occur from nutrient feed additives (i.e., zinc, selenium, copper, and sulfas) and growth promoting additives (i.e., antibiotics, Synovex, Rumensin, and endogenous hormones) would be initiated. The metabolic fate, routes of excretion, metabolites of these compounds in live animals, and the effects of these compounds on organs, tissues, meat, milk, and eggs, and residues that may occur in these products would be studied. Research was to be done on the potential human health hazards which may occur from the use of antibiotics in animals, both at therapeutic levels and at low levels in feeds, as judged by their ability to elicit bacterial resistance and how frequently that resistance is transferred within and between species, including humans. These should include the influence of length of feeding antibiotics on level of resistance of the enteric population, and ability of enteric bacteria to transfer R-factors.

B. *Meat Quality*

Biochemistry and physiological research approaches would be initiated to further identify the value of muscle as food. Electron microscopy would be used to further delineate the molecular architecture of muscle. More specifically, studies on hormonal, nutritional, and environmental effects on muscle development and composition; the specific blood enzyme of muscle origin which possibly

could be used to predict meat quality, the relationship of satellite cells to muscle growth and development; genetic markers to predict meat quality; the effect of hormones on the regulation and function of subcellular organelles; the effect of muscle ATPase on fiber types; the effect of sarcoplasmic reticulum Ca^{++} binding activity on meat quality; specific biochemical components that could be correlated with meat tenderness; the identification and enumeration of microorganisms in/on meat to insure lower microbial counts would be initiated. Also, the effect of feeding animal and poultry products of varying composition to animal models to delineate the specific effect on the circulatory system and cardiovascular problems would be studied.

C. *Biological Effects*

The objective is to develop a basic understanding of the biological effects, mutagenicity, carcinogenicity, and delayed neurotoxicity that sometimes result when livestock and poultry are exposed to certain chemicals or pesticides. An interdisciplinary research approach would be started to develop new rapid, reliable, inexpensive, and specific tests to detect mutagenic and carcinogenic responses. Research on the current genetic microbial assays using the *Ames Test*, the interaction effects of chemicals, in combination with inducers and cytogenetics tests to observe chromosome aberrations, would be studied. Basic research studies on the site of action to learn how the molecular parameters of the chemical and the reaction site interact would be initiated to determine how insecticides cause delayed neurotoxicity in some animal species.

Meat Researchers Serve Many

It is obvious that meat researchers serve many clientele groups—consumers, producers, processors, food distributors, government agencies, etc. These lists of research priorities support this statement. *It also* appears that individuals outside our association are attempting to list the meat research priority needs for us. Let us not be caught in the position of being told what research to do—but let us aggressively assume a leadership role in projecting future research needs. On the other hand, the information from these clientele groups will indeed be very useful in our determination of research priorities.

One final point, the establishment of research priorities is a continuing task. We cannot assume that once priorities are established that they will not be reordered. The ever-changing needs of society will

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dictate that a constant study be given to the future direction of our meat research needs.

Conclusion – Priorities Needed

In conclusion, I strongly urge that this association devote thought to the current and future needs for meat research and establish a list of priorities and justifications in a document that can be used by the AMSA members. The justification for each priority is especially important and should provide decision makers, not familiar with meat research, with answers to such questions as (1) Why is this research needed? (2) Who should benefit from the research and how will they benefit? and (3) How will the benefits come

—for example, greater meat yields, better nutritional value, improved quality, reduced cost, etc.?

Volunteers Needed

Obviously, if priorities are established, it will be done through volunteers or individuals assigned the task. Those who take on this task may consider the effort personally *unrewarding*, but if they are professionally dedicated to meat science, they should consider the potential significance of their work toward the advancement of meat science. I hope that I have convinced you that priority setting is necessary and that it be given high priority among the activities of this association.